TURCK

Industrielle Automation

User manual

BLCDP-4M12MT-2AI2AO-VI

Sense it! Connect it! Bus it! Solve it!

BLCDP-4M12MT-2AI2AO-VI

Edition: 2011-2-23

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1 General safety notes

1.1 Before the installation

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally restarted.
- Verify isolation from the supply.
- Earth and short circuit.
- Cover or enclose neighboring units that are live.
- Follow the engineering instructions of the device concerned.Only suitably qualified personnel in accordance with EN 50 110-1/-2 (VDE 0 105 Part 100) may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE) must be connected to the protective earth (PE) or to the potential equalisation.
- The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference do not impair the automation functions.
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that a line or wire breakage on the signal side does not result in undefined states in the automation devices.
- Ensure a reliable electrical isolation of the Ensure a reliable electrical isolation of the low low voltage for the 24 volt supply. Only use power supply units complying with IEC 60 364-4-41 (VDE 0 100 Part 410) or HD 384.4.41 S2.
- Deviations of the mains voltage from the rated value must not exceed the tolerance limits given in the specifications, otherwise this may cause malfunction and dangerous operation.
- Emergency stop devices complying with IEC/EN 60 204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency-stop devices must not cause restart.
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been installed with the housing closed. Desktop or portable units must only be operated and controlled in enclosed housings.
- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency-stop devices should be implemented.
- Wherever faults in the automation system may cause damage to persons or property, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks etc.).
- The electrical installation must be carried out in accordance with the relevant regulations (e. g. with regard to cable cross sections, fuses, PE).
- All work relating to transport, installation, commissioning and maintenance must only be carried out by qualified personnel. (IEC 60 364 and HD 384 and national work safety regulations).
- All shrouds and doors must be kept closed during operation.

2 General information

This manual includes all information necessary for the prescribed product. It has been specially conceived for personnel with the necessary qualifications.

ATTENTION

Please read this section carefully. Safety aspects cannot be left to chance when dealing with electrical equipment.

2.1 Description of symbols Used

WARNING

This sign can be found next to all notes that indicate a source of hazards. This can refer to danger to personnel or damage to the system (hardware and software) and to the facility.This sign means for the operator: work with extreme caution.

ATTENTION

This sign can be found next to all notes that indicate a potential hazard.This can refer to possible danger to personnel and damages to the system (hardware and software) and to the facility.

NOTE

This sign can be found next to all general notes that supply important information about one or more operating steps. These specific notes are intended to make operation easier and avoid unnecessary work due to incorrect operation.

2.2 Prescribed Use

Appropriate transport, storage, deployment and mounting as well as careful operating and thorough maintenance guarantee the trouble-free and safe operation of these devices.

WARNING

The devices described in this manual must be used only in applications prescribed in this manual or in the respective technical descriptions, and only with certified components and devices from third party manufacturers.

2.3 Notes Concerning Planning /Installation of this Product

WARNING

All respective safety measures and accident protection guidelines must be considered carefully and without exception.

3 Introduction

3.1 BL compact – High signal variety in a compact design

For the first time, BL compact provides a product family of IP67 fieldbus devices that can meet any requirement in the I/O level in terms of signal type and connectivity. Until now, compact fieldbus stations were applied to process only digital fieldbus signals. BL compact now allows a wide range of I/O tasks to be implemented outside of the control cabinet in a compact design with virtually any signal combination.

The basic concept

With the modular concept of the BL67 system by TURCK a fieldbus node can be installed outside the control cabinet using any signal combination. For this purpose, passive base and active electronic modules are connected to fieldbus gateways which fulfill application specific I/O tasks. Such a fieldbus node can take one gateway with up to 32 extension modules (max. 512 I/O points). For applications with low signal density and limited mounting space, BL compact is an efficient alternative because basically all BL67 I/O signals are also available in BL compact.

The modular principle

The BL compact devices provide three basic functions in a single housing: Fieldbus connection, I/O signal and connector. Depending on the housing style, one or two I/O modules can be housed. The smaller versions (e.g. M12S and M12MT) can link any BL67 electronic module each to PROFIBUS-DP or DeviceNet™. The bigger versions (e.g. M12LT) have space for two BL67 electronic modules, making the possibilities of signal combination nearly infinite.

NOTE

The I/O-system BL compact does not require mounting in an extra housing. It was specially designed for the harsh industrial environment and for direct mounting on the machine and in the process. The system is extremely robust and protected against dirt, dust and the most liquids through its high degree of protection. However, it is not suited for the following applications: high pressure jet cleaning, 100 % humidity, out-door installation or permanent operation in liquids.

4 Technical data

Type	BLCDP-4M12MT-2AI2AO-VI
Ident-No.	6811182
Supply voltage	24 VDC
Admissible range	18...30 VDC
System power supply	via separate source
Voltage supply connection	2 x M12, 5-pin
Operating current	750 mA
Nominal voltage V_i	24 VDC
Nominal voltage V_o	24 VDC
Max. sensor supply I_{sens}	4 A
Max. load current I_o	4 A
Fieldbus transmission rate	9.6 kbps…12 Mbps
Adjustment transmission rate	auto detetcion
Fieldbus addressing range	0...99
Fieldbus addressing	2 decimally coded rotary switches
Service interface	RS232 interface
Fieldbus connection technology	2 x M12, 5-pin, reverse keyed
Fieldbus termination	external
Analog inputs	
Input type	0/4 … 20 mA or -10/0 … 10 VDC
Type of input diagnostics	channel diagnostics
Sensor supply	24 VDC
Input resistance	0.065 or 225 kΩ
Maximum limiting frequency analog	< 20 Hz
Basic fault limit at 23 °C	< 0.3 %
Repeatability	< 0.05 %
Temperature coefficient	< 300 ppm/°C of full scale
Resolution	16 bit
Measuring principle	Sigma Delta
Measured-value display	16 bit signed integer 12 bit full range left justified
Analolgue outputs	
Output type	-10/0 … 10 V
Type of output diagnostics	channel diagnostics
Sensor supply	24 VDC, 250 mA per channel
Load resistance, resistive	> 1 kΩ
Load resistance, capacitive	< 1 µF
Transmission frequency	< 100 Hz
Basic fault limit at 23 °C	< 0.3 %
Repeatability	< 0.05 %
Temperature coefficient	< 300 ppm/°C of full scale
Resolution	16 bit
Measured-value display	16 bit signed integer 12 bit full range left justified
Operating temperature	-40...+70 °C
Storage temperature	-40...+85 °C
Protection class	IP69K
housing material	Glass-filled nylon, nickel plated brass connectors

7 / 22011 Hans Turck GmbH & Co.KG ● D-45472 Mülheim an der Ruhr ● Witzlebenstraße 7 ● Tel. 0208 4952-0 ● Fax 0208 4952-264 ● more@turck.com ● www.turck.com

5 Fieldbus and I/O connections

5.1 Pinning and wiring diagram

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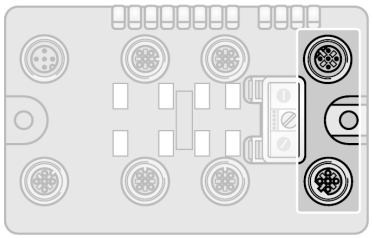
<td>  </td>
<td>Fieldbus accessories
PROFIBUS-DP fieldbus cable (example):
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Ident. no. 6914119</td>
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 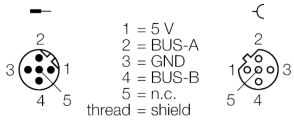
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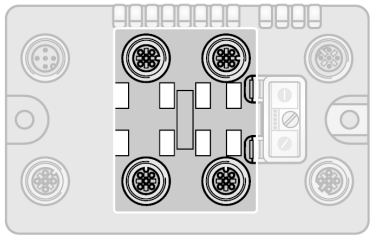
<td>  </td>
<td>Analog inputs and outputs
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Ident. no. 8016988</td>
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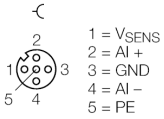
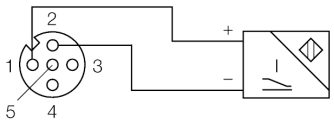
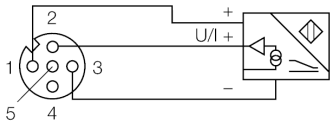
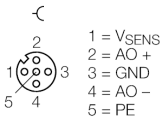
 

2-wire technology
 
3-wire technology
 
4-wire technology

Pin configuration, slot 2 to 3
 
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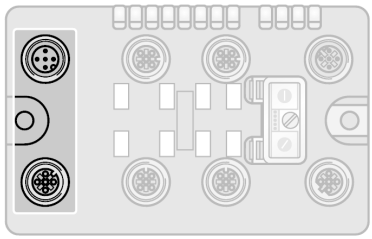
<td>  </td>
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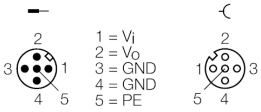
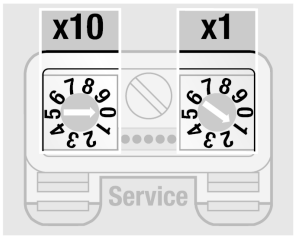
<td>Pin configuration
 
</td>
</tr>
</table>

6 Commissioning

6.1 Address setting

The PROFIBUS-DP address setting at the module is done via the two decimal rotary coding switches under the protective cover. A maximum of 100 addresses (00 to 99) can be allocated. Each address may be allocated only once in the entire bus structure.The bus address 00 must not be allocated.



6.2 Setting the transmission rate

The module provides automatic transmission rate detection.

All new settings become valid only after a power-cycle!

6.3 Field bus termination

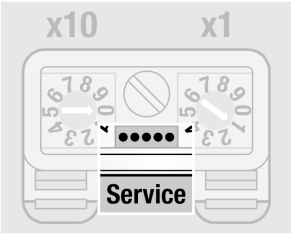
If the module is used as the first or the last station in the bus communication, the field-bus line has to be terminated using a terminating resistor.
The module offers no internal bus terminating resistor. The termination has to be done externally.

Passive terminating resistor,
RSS4.5-PDP-TR, Ident-no.: 66001590

Active terminating resistor,
PDP-TRA, Ident-no.: 6825346

6.4 Service interface

In order to connect the service interface on the module with a PC and the I/O-ASSISTANT software (project planning and diagnostics software), a cable with a pin assignment, different from the PS2 standard pin assignment, has to be used.



6 Commissioning

6.5 PLC configuration

TURCK provides a GSD-file for the integration of BL compact into PROFIBUS-DP.

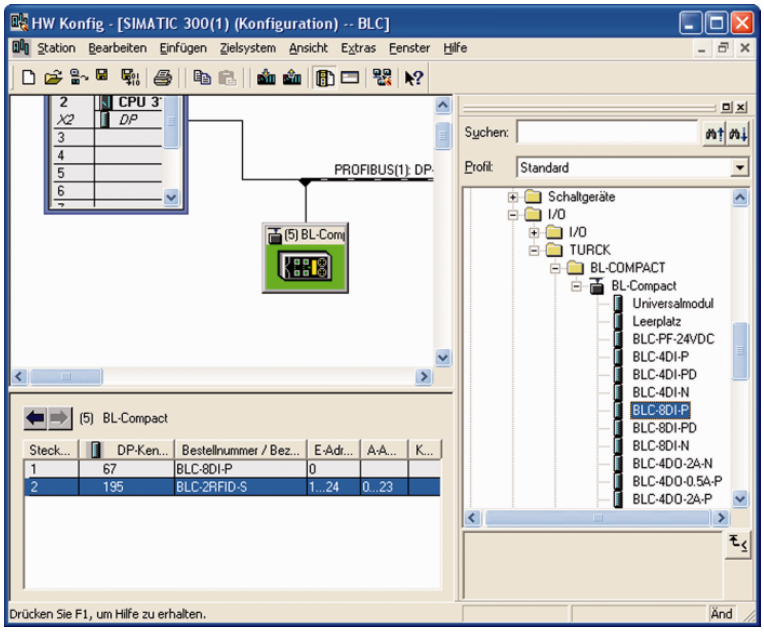
Commissioning in a configuration tool

Install the GSD-file in the PLC configuration tool eg. in “Step 7/ HWConfig“ from Siemens. After the installation, the BL compact stations can be found under “Additional Field Devices > I/O > TURCK >BL COMPACT“.

BL compact modules are shown as modular slaves with a PROFIBUS-DP-gateway and a maximum of 2 I/O-slots which have to be defined according to the module used in the application.

Doubleclick the BL compact folder and add an “empty“ BLCDP-module to the PROFIBUS-DP line. Now select the required I/O-functions and add them to the station.

The BL compact GSD-file can be downloaded *from www.turck.com*.

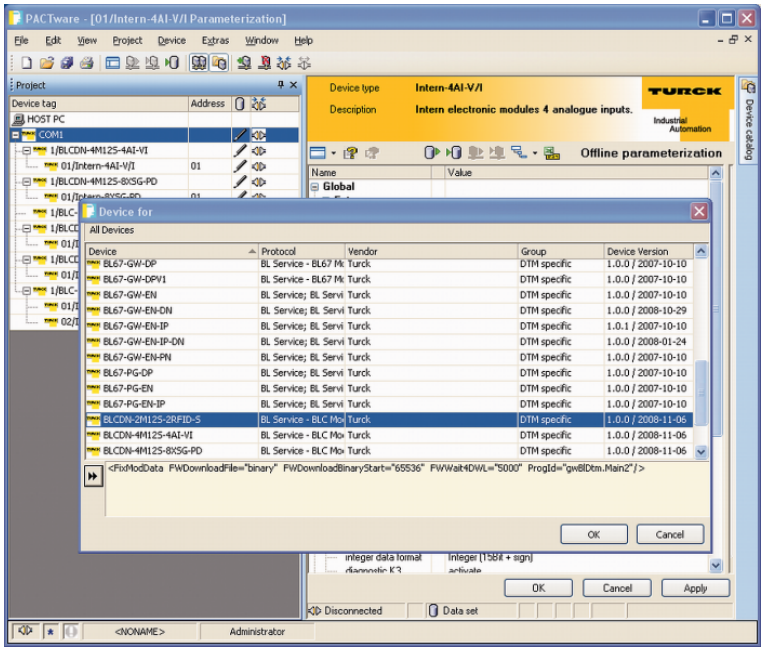


NOTE

For more detailed information about the PLC-configuration of TURCK PROFIBUS-DP-products, please read for example the respective BL67 manual D300570.pdf which can be downloaded from www.turck.com.

7 The I/O-ASSISTANT

The configuration software I/O-ASSISTANT supports you in planning and implementation of an I/O system.
No matter if you are online or offline, the software simplifies the configuration and parameterizsation of the modules. The I/O-ASSISTANT is also extremely helpful in system set-up and testing.



7.1 FDT/DTM

The system configuration, parameterization and diagnostics are done via graphical interfaces based on FDT/DTM technology.
The DTMs can be integrated in any FDT frame application for configuration, commissioning and maintenance.
The I/O-ASSISTANT and the DTMs are available free of charge on www.turck.com.

Software functions

- Supporting software tool
- Configuration, parameterization and commissioning of BL Compact modules via a DTM-technology
- Import of BL Compact DTM-files
- Offline planning and configuration of BL67, BL20 and BL compact I/O modules
- Reading and setting of process data
- Commissioning help for testing the wiring and sensors without PLC
- Automatic documentation of configured TURCK-systems

8 LED description

8.1 Stations LED Status

LED	Colour	Status	Description
IOs		OFF	No power
	RED	ON	Low power or station error
	RED	FLASHING (1 Hz)	I/O module configuration error
	RED	FLASHING (4 Hz)	No I/O module bus communication
	GREEN	ON	Station ok
	GREEN	FLASHING	Force mode active
DIA		OFF	Station sends no diagnostics
	RED	ON	Station sends static diagnostics
	RED	FLASHING	Station sends extended diagnostics
BUS		OFF	No field bus communication
	GREEN	ON	Field bus communication active
	GREEN	FLASHING (1 Hz)	No field bus communication active, device status OK
	RED	ON	Bus error at the gateway; no data exchange
	RED	FLASHING	Faulty PROFIBUS-DP address

8.2 I/O LED Status

LED	Colour	Status	Description
D *		OFF	No diagnostics active
	RED	ON	Station error/ module bus communication failure
	RED	FLASHING (0.5Hz)	Any diagnostics active
AI Kanäle		AUS	Kanal deaktiviert
0...1	GRÜN	AN	Kanal aktiv
	GRÜN	BLINKEND (0.5 Hz)	Messbereich unterschritten
	GRÜN	BLINKEND (4 Hz)	Messbereich überschritten
AO Kanäle			Ohne Funktion
2...3			(Die analogen Ausgänge verfügen über keine LED)

* D LED also reports gateway diagnostics

9 Mapping and diagnostics

9.1 I/O Data mapping

INPUT	BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Ch 0	0	AI 0 LSB							
	1	AI 0 MSB							
Ch 1	2	AI 1 LSB							
	3	AI 1 MSB							

OUTPUT	BYTE	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Ch 2	0	AO 0 LSB							
	1	AO 0 MSB							
Ch 3	2	AO 1 LSB							
	3	AO 1 MSB							

9.2 xAIxAO - Diagnostic messages DPV1

Error code no.	Meaning
6	open circuit
7	measurement value range error (OoR)
8	
9	over-/underflow (OUFL)
21	hardware error

10 Parameter

10.1 PROFIBUS-DP Parameters

Parameter	Description
startup when expected/actual config. differ	0 = activated * Reaction depending on the parameter „Bit 6: Static configuration". If the static configuration is deactivated, the process data exchange is not disturbed in case of module sequence error. 1 = deactivated Reaction depending on the parameter „Bit 6: Static configuration". If the static configuration is activated, the process data exchange is not disturbed in case of module sequence error.
static configuration	0 = activate * Changes in the station configuration are stored in the gateway following a power-on. 1 = deactivate If the static configuration is deactivated, a dynamic configuration take-over is realised directly following station configuration changes (important for acyclic parameterisation). The station stops the process data exchange and the bus communication as soon as a module sequence error appears, ignoring the parameterisation for error handling. But, the communication is not interrupted, if the gateway-parameter byte 1, bit 0 "startup.
outputs fieldbus error	0 = output 0 * The gateway switches the outputs of the modules to "0". No error information is trans-mitted. 1 = output substitute value The gateway switches the outputs of all modules (with the exception of analog output modules) to "0". Error information is transmitted to the analog output modules. Depending on their configuration, these modules set their outputs either to "0" or to a default value, or maintain the original values. The non-configured analog output modules set their outputs to "0". 2 = hold current value The gateway maintains the actual output settings of all modules (with the exception of analog output modules). Error information is transmitted to the analog output modules. Depending on their configuration, these modules set their outputs either to "0" or to a default value, or maintain the original values. The non-configured analog output modules maintain their current output settings.
outputs mod. sequence error	0 to 2, see above "outputs fieldbus error" 3 = Exchange process data The gateway carries on exchanging process data with the other module bus stations. No error information is transmitted.
outputs mod. sequence error	0 to 3, see above "outputs mod. sequence error"
integer data format	0 = LSB first * Data is converted to INTEL format (standard format). 1 = MSB first 16-bit data are transmitted with the high and low bytes reversed (MOTOROLA format). This parameter influences the process data!
diagnostics from modules	0 = activate * Diagnostic messages from the module bus stations are made known to the fieldbus master as extended diagnostics. 1 = deactivate Diagnostic messages from the module bus stations will not be displayed. A station diagnostic is not automatically generated along with module diagnostics.

10 Parameter

Parameter	Description
Vo diagnostics	0 = activate * The monitoring function for the field supply Vo (from gateway and power feeding modules) is activated. If this parameter is set but the parameter "Diagnostics from modules" (see above) deactivated, then only the voltage supply at the gateway is monitored. A monitoring of the voltage supply at the power feeding module is not realised. 1 = deactivate A possible over- or undervoltage at UL will not be detected.
I/O-ASSISTANT Force Mode	0 = release * I/O-ASSISTANT can set the force mode. 1 = block I/O-ASSISTANT cannot set the force mode, if the station was parameterised by the DP master.

* default setting

10.2 xAIxAO-VI - Parameters

Parameter	Description
Operation mode Kx	In-/ and outputs: 0 = voltage -10...10 V DC standard * 1 = voltage 0...10 V DC standard 2 = voltage 0...10 V DC PA (NE 43) 3 = voltage -10...10 V DC PA (NE 43) 4 = voltage -10...10 V DC ext. range 5 = voltage 0...10 V DC ext. range
	Inputs only: 8 = current 0 ... 20 mA standard 9 = current 4 ... 20 mA standard 10 = current 0 ... 20 mA PA (NE 43) 11 = current 4 ... 20 mA PA (NE 43) 12 = current 0 ... 20 mA ext. range 13 = current 4 ... 20 mA ext. range
	63 = channel not active
Value representation Kx	0 = Integer (15 bit + sign) * 1= 12 bit left justified
Diagnostic Kx	0 = release * 1= block
Behaviour module bus error	0 = output substitute value * 1 = hold current value
Substitute value Ax	The substitute value will be transmitted if the respective parameters of the gateway have been set to „output substitute value“.

* deault setting